# The Open University of Sri Lanka
# Faculty of Engineering Technology
# Department of Textile and Apparel Technology

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| Study Programme | : Advanced Certificate in Industrial Studies |
| Name of the Examination | : Final Examination |
| **Course Code and Title** | : **TAZ2535/TTZ1235Mathematics & Science** |
| | **for Textile &Apparel** |
| Academic Year | : 2017/18 |
| Date | : 21st January 2019 |
| Time | : 1330-1630hrs |
| Duration | : **3 hours** |

## General Instructions

1.  Read all instructions carefully before answering the questions.

2.  This question paper consists of **Eight (8)** questions in **Five (5)** pages.

3. **Answer Question 01, which is compulsory** and additional **Five (5)** questions only. Question 01 carries 25 marks and questions 2 to 8 carries fifteen (15) marks each.

4. Answer for each question should commence from a new page.

5. Answers should be in clear hand writing.

6. **You should clearly show the steps involved in solving problems.**

7. **No marks are awarded for the mere answers without writing the necessary steps.**

( Take g=10 ms$^{-2}$ )

## Compulsory Question

(1)

    (i) Distinguish vector quantities and scalar quantities. Give two examples for each. **(02 marks)**

    (ii) State the "Law of vector triangle " **(02marks)**

    (iii) Distinguish "mass" and "weight" **(04 marks)**

    (iv) Write the following figures in standard form. **(02 marks)**
        (i) 0.0000026         (ii) 84500

    (v) Determine the "gradient " and the "intercept " of the straight line
        $4X + 3Y = 8$ **(02 marks)**

    (vi)A person borrows Rs 100,000 for 12% interest rates per annum from a bank.How much money should he pay to settle the loan at the end of the year. **( 02 marks)**

    (vii) Mass of a fabric of size 15x 15cm is 10 gramme. Calculate the surface density of the fabric. **( 02 marks)**

    (viii) Define the following quantities, "work" and "energy" **( 02 marks)**

    (ix) Determine the gram molecular weight of Glucose $C_6H_{12}O_6$
        (C =12, O=16, H=1) **( 04 marks)**

    (x) Calculate the concentration of sodium hydroxide (NaOH) solution, if

    3 mols of sodium hydroxide is dissolved in 2 litres of solution.

**( 03 marks)**

**Answer any five (05) questions from following seven (07) questions**

(2) (a). Define following terms.

(i) " % Moisture Content "   (ii) ":% Moisture Regain" of a cotton sample

(iii) Absolute Humidity      (iv) Relative Humidity          **(08 marks)**

(b) Describe how would you determine the "%moisture content" and "%moisture regain" of a given cotton fibre sample in a textile laboratory
**(07 marks)**

(3) (a) Discuss the importance of 'linear density' in textile yarn and fibres.

**(06 marks)**

(b) Denier count is defined as the weight in grams of 9000m of yarn.

Calculate the mass of a 500 m of a yarn which has The Denier count 150. **(06 marks)**

(c) Calculate the mass of a 2 m$^3$ of a metal block, which has the density 9000 kgm$^{-3}$

**(03 marks)**

(4) (a) Use the **theory of indices** to simplifying the following expressions.

(i) $(729)^{2/3}$          (ii) $(64/343)^{1/3}$

(iii) $(256)^{0.25}$          **(03 marks)**

(b) Simplify the following

$$\left(\frac{27}{64}\right)^{-1/3} \times \left[\frac{729}{512}\right]^{2/3} \times [7]^0 \qquad \textbf{(06 marks)}$$

(c) Determine the value of 'x' in the following equation.

$16^{(x+1)} = 32$          **(06 marks)**

(5) (a) Solve the following equations

(i) 3x -5y= 31

8x +4y+56 =0

(ii) $\dfrac{3x+8}{8} - \dfrac{2x-7}{3} = x - \dfrac{2x+3}{6}$

**(10 marks)**

(b) The sum of money between Saman and Kamal is Rs 600.Saman has Rs 200 more than that of Kamal. Calculate the amount of money each has.

**(05 marks)**

(6) (a)What are the **S.I units** of the following quantities. **(02 marks)**

(i) Electrical Power    (ii)Temperature

(iii) Electric Potential  (iv )Area

(b) Convert following  into SI Units. **(09 marks)**

(i) 50,000 mm       (ii) 36 Km/h       (iii)100nm

(iv) 100 $(\mu m)^2$     (v)50MW       (vi) 10 $gcm^{-1}$

(c ) A Vernier scale is designed in such a way that 99 mm in main scale is divided into 100 equal divisions in the Vernier scale. Calculate the least count of the Vernier scale. **(04 marks)**

(7) (a) State the Newton's Laws of motion. **(03 marks)**

(b) Define the "Force " using the $1^{st}$ Newton's Law. **(04 marks)**

( c ) Write four  applications of Newton's third Law

**(04 marks)**

(d) An object of mass 5 kg is accelerating at 2 ms $^{-2}$ ,If the force is doubled and mass is halved, What is the new acceleration of the body?

**(04 marks)**

(8) (a)Describe following

    (i)Acids              (ii) Base

    (iii)pH              (iv) Dilute and concentrated solutions

**(06 marks)**

(b) Describe the following terms
    (i) Atomic number     (ii) Mass number
    (iii) Atomic structure   (iv) Atoms and ions

**(06 marks)**

(c) The Atomic Number of Uranium is 92 and Mass number is 235,Determine the number of electrons, protons and neutrons in a Uranium atom. **(03 marks)**